

AMATEUR SATELLITE REPORT

AMSAT's Newsletter for the Amateur Space Program.



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New Voice Technique Debuts On AO-10

Amateur Radio turned another major corner recently with the first test of a new voice processing technique on AO-10. The test was performed 24 Aug. 84 under the first phase of a three phase program, Project Companion.

Amplitude Compandered SideBand (ACSB) is a technique which offers strong potential for impressive improvements in intelligibility of voice signals under less than ideal conditions. Project Companion is a joint endeavor of AMSAT, ARRL and Project OSCAR.

In the 24 Aug. test, Greg Bonaguide, WA1VUG, of the ARRL's Technical Department operated a specially modified ACSB transmitter at the ARRL HQ station W1AW in Newington. The ACSB equipment was on loan from the principal ACSB patent holder, Sideband Technology, Inc. of Rochester, N.Y. At STI an AO-10 receiver tuned to W1AW and taped the transmissions both with and without the ACSB processing enabled. According to ARRL Technical Department Manager Paul Rinaldo, W4RI, the results were dramatic. "It took a pretty crummy signal and made it sound very good," Paul told ASR.

An improvement in intelligibility equivalent to a 10 dB improvement in signal to noise ratio is touted for ACSB under AO-10-like conditions according to Rinaldo and AMSAT Engineering Vice President Jan King, W3GEY. King is working with ACSB as part of a commercial enterprise, Skylink, which proposes to provide commercial satellite communications to, among others, vehicles in sparsely populated areas where more conventional mobile telephone services (such as cellular mobile telephone) are not economically viable. ACSB is seen to offer substantial improvements for the mobile user as well as the Amateur Satellite user.

ACSB is an improvement of amplitude compression techniques in use for years. Two stages of compression and the injection of a low-level pilot tone at the transmitter distinguish modern ACSB from earlier techniques, however. At the receiver two stages of decompression expand the dynamic range of the audio. The pilot tone provides two very important functions. First, its amplitude at the receiver is a gauge to the amount of expansion required to restore the signal to the original. Second, the pilot tone functions as an AFC post to correct for Doppler shift. In the 24 Aug. test, W4RI reported the SSB signals were perfectly tuned and locked thanks to the AFC effect. Moreover, Rinaldo

adds, the fast attack/release of the expander did much to alleviate the effects of spin modulation. ACSB can be received on unmodified, regular SSB receiver but to realize the advantages of the new technique, an ACSB-modified receiver is required.

Amateur interest in ACSB has been growing recently. Stimulating talks by Jim Eagleson, WB6JNN and Paul Shuch, N6TX of Project OSCAR have fueled the interests more.

The Project Companion team was conceived from a desire to coalesce similar interests. ARRL is seeking a means of transmitting voice bulletins directly to amateurs by using AO-10 and a network of VHF/UHF gateway repeaters. A signal-to-noise ratio of 20 dB is the approximate target for the grade of service required. ACSB can help insure the signal quality remains high even in marginal conditions. AMSAT similarly is seeking ways to improve quality of transmissions on AO-10. Project OSCAR is seeking a new-technology project which will improve satellite communications. All three recognize the potential of ACSB for breaking new ground; fulfilling one of *Amateur Radio's* charter issues.

N6TX and WB6JNN are the Project Engineers for Project OSCAR; W4RI and WA2LQQ are Project Engineers for ARRL and AMSAT respectively. Project Companion has three phases and the project will run 18 to 24 months. In Phase 1, technology demonstrations using off-the-shelf commercial equipment will demonstrate what advantages are afforded using ACSB as compared to normal SSB. In Phase 2, up to one hundred ACSB units will be fielded for tests on AO-10 and other venues as appropriate. In Phase 3, amateur-designed ACSB units using the experience gathered up to that point will be designed and the technique will be proliferated. Once the technique is established, Project Companion officials have little doubt the technique will be commercialized in the ham market by the major manufacturers. There are now a half dozen ACSB suppliers in the commercial marketplace.

W4RI writes about ACSB and Project Companion in the August edition of QEX, the ARRL Experimenters Exchange. Paul points out that an overview of ACSB together with a bibliography is to be found in the 1984 ARRL Handbook. If you care to be involved with ACSB development or testing, contact W4RI, WB6JNN, N6TX, or WA2LQQ. Authors familiar with ACSB are solicited for articles in *Orbit* and *QST*.

Short Bursts

- The first flight of ESA's Ariane 3 was an unqualified success. Lifting off from its Kourou pad on 4 August, the new version of Ariane successfully deposited ECS-2 and Telecom 1A into the proper geostationary transfer orbits. It was the tenth launch of the Ariane vehicle and the first to use two strap-on solid fuel boosters. Addition of the boosters and other propulsion system improvements have raised the payload to transfer ellipse capability to 2585 kg (5,687 lb.) for a single payload or two satellites each weighing 1195 kg (2,629 lb.). AMSAT's Phase IIIC payload may ride an Ariane 4, a further growth from the Ariane 3.
- Jack Somers, WA6VGS, Deputy Chief Area Coordinator, is making "OSCAR Information" sheets available for hamfests and conventions. Showing the bandplan and frequency charts, the handouts are FREE for the asking and are available in reasonable quantities (100, 200, 300 ??) upon request. Also enclosed is an informative sheet on how to use the AMSAT QSL bureau. The cost of the charts is absorbed by Henry Radio to which AMSAT is grateful! Write: Jack Somers, WA6VGS, c/o Henry Radio, 2050 Bundy Dr., Los Angeles, CA 90025.
- The August issue of "SSTV Today" edited by Ron Flynn, KB8LU has a nice writeup on AO-10 and SSTV. In an article by Flynn together with Roger Schultz and Jim Wilson, the authors do a fine job of explaining how to get started on AO-10. Well worth the reading, we'd say!
- AMSAT is now on MCI mail. Mail name is AMSAT. Mail ID number is 170-2860.
- The Marshall Amateur Radio Club Experiment, MARCE, will be launched on a Space Shuttle 1 Oct. 84 in GAS (Getaway Special) #007. The experiment will telemeter data on a downlink frequency of 435.033 MHz. This signal may be monitored *directly* or may, in just the perfect circumstance, be relayed to earth by AO-10. If AO-10 picks up the MARCE telemetry on 435.033, AO-10 will relay on the Mode B downlink at 145.972, the Special Service Channel (SSC) H1. Data will be sent as synthesized voice numbers on a FM carrier. A telemetry decode aid sheet is available from ARRL. An SASE to GAS #007, C&TD, ARRL, 225 Main St., Newington, CT 06111 will obtain the sheet for you. Further details and orbital predictions in a future ASR. Full details on the experiment are on page 46 of the September 84 QST.
- The first gateway operation in the New York metropolitan area was accomplished on 18 August at 0100 UTC. KC2ZF organized a group in Staten Island using a 220 MHz repeater. Thirty miles north, WA2LQQ operated a gateway to AO-10, Mode B, using the repeater's autopatch capability. More than a dozen satellite contacts were made in short order. The highlight was a FB QSO with an HG in Budapest.
- At presstime, the anticipated AO-10 schedule change remained anticipated.
- First flight of Space Shuttle *Discovery* is due 29 August. WB4ZXS will transmit Shuttle audio on AO-10 SSCH2, 145.962 MHz.
- First successful 2 meter meteor scatter packet QSO is reported by K1HTV and W0RPK. Although it took 2 hours and 45 minutes to accomplish, the QSO probably will stand as a first. The event took place during the peak of the Perseids meteor shower on 12 Aug. 84. K1HTV is in

Maryland while W0 is in Iowa; a path of about 1200 miles. Others participating in the Perseids PacScat tests were WB6YMH, K0RZ, N0AN, K0CY, WA0WYW, W9UUU, K1KSY, KQ1E, W0RLI, AA2Z, K8KA, W3IWI, KA0IAB, W0PN, W0VB, KB2M and WA2LQQ.

- A new ARRL newsletter, "Gateway" has debuted. The topic is packet radio and the editor is ARRL's K8KA. "Gateway" is available for \$6 (ARRL members) and \$9 (non-members) for 25 issues. First class mail (U.S., Canada and Mexico) will cost \$11 (m) and \$14 (nm). Overseas costs are \$14 (m) and \$17 (nm). Write ARRL HQ.
- AMSAT Director election ballots go into the mail around 1 Sept. If you don't get one, chances are your membership has run out. Isn't it time you did something about that??
- Interested in contributing to AMSAT with your effort rather than your \$\$\$? Get in touch with WD4FAB. He may be able to get you working on something that will benefit both AMSAT and you.
- Bob Grove, WA4PYQ, recently cited by AMSAT for his enthusiastic support of the amateur satellite program writes: "It has been my privilege to report to our thousands of readers [in Monitoring Times] the exemplary program of AMSAT. Their contribution to amateur radio and to technology in general is a model of cooperation, commitment and dedication. We shall continue to support this fine organization and encourage similar efforts by other experimenter groups to follow their example."

Letters To The Editor Department

Among the pleasures of editing a widely read newsletter are the occasional golden nuggets that appear in one's mailbag. Here's a pretty good "fer instance."

Dear Rip:

I have just returned from a trip to the Peoples Republic of China where I was very pleased to learn that BY1PK in Beijing (formerly Peking) is set up for OSCAR 10 operations.

I was there with my wife and three children and we spent a fascinating afternoon at the BY1PK station. Our guide, after quite a bit of investigation, finally discovered the address and telephone number of the Institute where the station is located and set up an appointment for us to meet the three key men, Mr. Ton, Mr. Wang, and Mr. Yan.

We were about half an hour late because our driver could not find the Institute, and I was very embarrassed that Mr. Wang had been waiting out on the street for us. He led us up the five flights of stairs for some tea and discussion of Amateur Radio.

Going into the building we could see an array of 435 MHz and 145 MHz circularly polarized antennas with azimuth and elevation rotors and a large tribander. Thus, when we sat down for tea, I immediately asked about their OSCAR 10 operations. Unfortunately, communication was quite difficult since our guide knew no ham radio terms and since the Chinese hams spoke only Chinese. We did understand, however, that they had no way of figuring out where the satellite was. I offered to send them a printout for the next 18 months, and they were extremely happy.

With this promise, we moved into the shack — and to

my amazement, not only did they have an array of very fancy and complete hf, vhf and uhf equipment, but also on a table to the left was an Apple II which VE7BC had given to the station. I exclaimed immediately that they could use the Apple to locate OSCAR 10, but they said that the computer did not work since it was missing a part.

Meanwhile, however, my 11 year old daughter had located a pile of about 10 disks, had inserted one of them, and was playing Pacman. Thus the computer was working. To boot, one of the disks was marked "W3IWI"!!! My 15 year old son had soon pushed his sister aside trying to run Tom's program, but the disk would not boot. We needed DOS and there was no Apple disk to be found. A careful testing of all the disks which were there, however, led to the discovery of DOS 3.3 on one of the game disks and we were in business.

The next problem was that the only orbital elements on the disk were for OSCARS 7, 8 and the famous "submarine trajectory" into the water which Tom inserted in the early version of his program. Where could we find a new set of elements? I knew that QST had published them last year, and I had seen a copy of QST in the shack, but I was afraid that they had stopped publishing them this year. I was wrong, however. The March QST set forth a full set of Keplerian elements, signed by Phil Karn and ten minutes later, after computing the latitude and longitude of Beijing in west degrees from the big world map on the wall centered on China, the little Apple was printing out up-to-date tracking. Unfortunately, the satellite was not within range.

Our next challenge was to teach the Chinese how to run the program and with our French speaking guide, to whom we translated the program, and the Chinese Hams taking notes in their language, it took about two hours before they were running the program. Once it was running, however, it would be hard to describe their joy. They insisted that I sit down and play on hf.

By this time it was 5:30 in the afternoon, or 16:30 GMT. The band was open to the west coast and I had a wonderful time. Unfortunately for DX lovers, I prefer talking to working a pileup and I spoke to five hams and unsuccessfully tried to raise a fellow ham from 9-land. Only Californians seemed awake.

Our new Chinese friends would have been very happy for me to stay, but we had another commitment. They had me sign a form in Chinese which I could not understand but which they explained gave me the right to operate the station and they invited me back as soon as possible.

Obviously, I now hope to work them on OSCAR 10 but I am afraid that that will be very difficult since their English pretty much rules out ssb contacts, and my cw is nil. I have written them, however, and hope to hear back.

Best 73's,
K9LF

TAPR Opens Office In Tucson

Tucson Amateur Packet Radio (TAPR) President Lyle Johnson, WA7GXD, sends the following:

Tucson Amateur Packet Radio (TAPR), an international Amateur packet radio research and development group bas-

ed in Tucson, Arizona, is proud to announce the opening of its office, effective Monday, 20 August 1984!

The office address is:

Tucson Amateur Packet Radio
1016 East Pennsylvania Avenue
Suite 302
Tucson, AZ 85714

The mailing address remains:

Tucson Amateur Packet Radio
P.O. Box 22888
Tucson, AZ 85734-2888

The telephone number is:

(602) 746-1166

The office hours are:

9:00 AM - 5:30 PM (Mountain Standard Time)
Monday - Friday

The gentle voice at the TAPR end of the line belongs to Karen Makus. Karen is a non-technical person, so please don't ask her how to write a terminal program for your packet station! However, in her role as Office Manager, she will do everything she can to expedite servicing your information requests, providing spare parts support for your TAPR TNC, filling orders and the like.

Technical questions will be routed to volunteer staff for answering, so please mail such questions to the TAPR PO Box.

It is our goal to provide 48 hour (or faster) turnaround on all standard transactions (memberships, renewals, TNC and parts requests, general information needs, etc.) and faster service on non-standard ones.

We at TAPR wish to thank you for your continued support, and look forward to being of greater service to you through our new facility.

Kettering's Perry Retires

Geoffrey Perry, Headmaster of the Kettering Boys School north of London, England has retired. For 27 of his 30 years at Kettering he had led students in a fascinating, sometimes brilliant study of foreign satellite activity. His expertise in Soviet satellite monitoring made him a favorite among the world's journalists. He would often provide tantalizing hints based on his observations made with the barest of equipment. His receivers were World War II vintage for the most part. His total computer capacity was often held in his hand; a hand calculator. Nevertheless he learned much about the Soviet satellite operations with the help of a bright crop of eager students.

Notoriety first came to Perry and Kettering when in late 1977 he and his students predicted the demise of Cosmos 954, a Soviet ocean surveillance radar satellite. Cosmos 954 was nuclear powered and posed a significant threat. In January 1978 the U.S. notified its allies of the imminent reentry of Cosmos 954. Kettering had predicted January 25. It fell on Northwest Territories, Canada, on January 24.

Then in November, 1979, Perry noticed unusual activity in a Soviet photo reconnaissance satellite. Something clearly was about to happen in the Himalayas. One month later the Soviets invaded Afghanistan.

Perry was the subject of a "60 Minutes" television broadcast on the U.S. CBS network on 21 Feb. 82. Journalists were

especially fond of Perry inasmuch as he was unshackled by the secrecy normally shrouding the topic. And although the consensus of journalists was that he probably didn't learn much about Soviet space hardware that wasn't already known, he was in fact the only source willing to talk. Perry was said to have commanded notable respect mainly on the basis of his extraordinary deductive ability and his uncanny talent for extracting the most information from minimal instrumentation.

A group under Perry called the "Kettering Group" numbering about 10 around the world will continue the activities.

News From Surrey

The following is excerpted from a recent UoSAT Bulletin from G3YGO.

UoSAT Bulletin-B9

24th August 1984

General News

Future UoSAT Missions are being proposed and studied, varying in scope from UO-9 and UO-11 orbits to Phase III and involvement in Geosynchronous orbits. We would be very interested to hear of any (reasonable!) suggestions or areas of interest that you may have — please direct to G3YGO.

One such future mission possibility being considered is the use of an Ariane-4 launch to place a constellation of six (or maybe cut down to three) small amateur satellites into geosynchronous orbit. The spacecraft would be transferred into geosynchronous orbit by a common 'carrier' module, ferrying the spacecraft through the drift phase of the orbit and then depositing them, two at a time, at positions around the equator. It is proposed that each spacecraft carry at least a Mode-L transponder. A project of this scale would clearly have to be undertaken by an international AMSAT team, probably US/DL/UK and each group would also furnish additional experiments in keeping with their interests. This is an ambitious idea (and costly) but could advance amateur radio communications by a further quantum leap, however it is early days yet and this scale of mission may not prove practicable or even desirable. What are YOUR thoughts?

A Masters Degree in 'Satellite Communications Engineering', based heavily around the experience gained through the UoSAT Projects, will commence at the University of Surrey this October — although welcome, this adds, however, to the already overloaded UoSAT Team! Details again available from G3YGO.

Three Active Magnetospheric Particle Tracer Expt. (AMP-TE) spacecraft were launched successfully by NASA DELTA from Cape Canaveral on Thursday 16th August — after three aborted launch attempts following ground station computer malfunctions and the discovery of debris in the vehicle. A small UK spacecraft, contributed by the UK SERC, was mounted between the two large US and DL spacecraft —

UoSAT contributed to the Particle Wave Experiment on this s/c. The spacecraft have been in orbit over a week now and are reported to be functioning very well.

UoSAT-OSCAR-9 Schedule

The Bulletin/Digtalker/Telemetry on UoSAT-1 will run through to Wednesday 29 August due to a UK national holiday on Monday and a UoS holiday on Tuesday! It is hoped that a more normal service will resume soon on UoSAT-1. The preparation of the Bulletin is being re-organised to spread the workload and items of relevant interest for the Bulletin are always welcome — the weekly deadline is 10.30 local time each Friday — and should be sent to the UoSAT Team in writing.

We have received a suggestion that it might be useful to include line numbers in the Bulletin. This would be useful for those using computers to gather the Bulletin as it would allow them to assemble a complete Bulletin from noisy data on multiple orbit passes without manual editing. This feature would, however, reduce the space available for text — what are YOUR thoughts please!

Special 'Notice Board' items for demonstrations/displays using UoSAT are also welcome as they can add 'interest' to such activities.

The H.F. Beacons Expt. will be in use this week.

UoSAT-OSCAR-11 Operations

Saturday —	#2479, channels 1,2,3,52 reset at 11:49:30 #2484, channels 1,2,3,52 reset at 19:46:45
Sunday —	#2498, channels 1,2,3,52 reset at 18:49:30
Monday —	#2507, channels 1,2,3,52 reset at 09:48:25
Tuesday —	#2521, channels 1,2,3,52 reset at 08:47:40 #2522, channels 0,10,20,30,50,51 reset at 10:32:00 #2528, ODATA ran incorrectly - no data #2529, channels 1,2,3,52 reset at 21:40:50
Wednesday —	#2536, channels 1,2,3,52 reset at 09:29:48 #2537, channels 17,18,19,27,28,29 reset at 11:07:55 #2542, channels 40,50,51,52,53,57 reset at 18:59:31
Thursday —	#2551, channels 40,50,51,52,53,57 reset at 10:11:25 #2552, channels 1,2,3,52 reset at 11:47:00 #2556, channels 1,2,3,11,38,49 reset at 18:04:55
Friday —	#2565, channels 1,2,3,52 reset at 09:10:50

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